UNDERSTANDING ACRE FOR COTTON

Suwen Pan, Darren Hudson, Don Ethridge, Maria Mutuc, Mohamadou Fadiga, and Phil Johnson[1]

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Department of Agricultural and Applied Economics
Texas Tech University

[1] Authors are Research Scientist, Combest Agricultural Competitiveness Chair and CERI Director, Professor (retired), Post-Doctoral Research Associate, Post-Doctoral Research Associate, and Thompson Professor of Agricultural Finance. The authors appreciate the assistance of Samantha Yates with graphic design and John Robinson, Shawn Wade, and Lloyd Arthur for comments on earlier drafts of this paper and assistance with data. This paper is provided for informational purposes only and Texas Tech University, CERI, nor the authors are responsible for how readers choose to use the information provided.

UNDERSTANDING ACRE FOR COTTON

The *Food, Conservation, and Energy Act of 2008* was passed into law on May 22, 2008 with veto override votes in the House of Representatives and the Senate (House 2008). A difference between the 2002 and the 2008 bills is the newly instituted revenue-based counter-cyclical program called the Average Crop Revenue Election (ACRE) program available beginning crop year 2009. The ACRE program is offered as an alternative to the counter-cyclical payment (CCP) program that was in place during the 2002-2008 period. Beginning with the 2009 crop year, producers will have the option to enroll their farm in either the CCP program or the ACRE program. If ACRE is elected, producers cannot change program participation for the duration of the 2008 farm bill (ERS 2008). This is a very complex decision due to the number of variables that must be considered and depends on the individual farm situation. It requires that farms, rather than crops or commodities, enter the program, so that the decision relies on the impacts of program choice on farm income. That aside, understanding commodity situations is a first step toward understanding and making decisions on individual farm situations. The purpose of this briefing paper is to provide assistance in understanding the differences between the ACRE and CCP programs for one crop, cotton, in one state, Texas. The briefing paper will also show the results of a comparison between CCP and ACRE payments using a sample of actual farm data.

Background on ACRE

The ACRE program is an average revenue guarantee for participants based on two different benchmarks—farm level and state level revenue. It provides producers with payments for a commodity when the actual state revenue for a commodity falls short of the state-based revenue guarantee AND the farm revenue falls below the benchmark farm revenue. The purpose of the ACRE program is to provide some measure of revenue assurance to farmers against both low yields and price drops. Table 1 shows a side-by-side comparison of the key provisions of the CCP and ACRE programs.

Some key features of the ACRE and CCP programs for cotton need to be underscored. First, the loan rate remains at 52¢/lb. if the producer elects to participate in the CCP program. However, if a producer elects to participate in the ACRE program, the loan rate declines to 36.4¢/lb. Also, the direct payment rate under the CCP election is 6.67¢/lb., whereas the direct payment rate is 5.336¢/lb. if ACRE is chosen. The target price, however, remains the same. Finally, annual payments are calculated differently (described below); but, both CCP and ACRE payments are based on 83.3% of base acres for crops in 2009-11 and 85% for crops in 2012 (ERS 2008).

ACRE and CCP Calculations

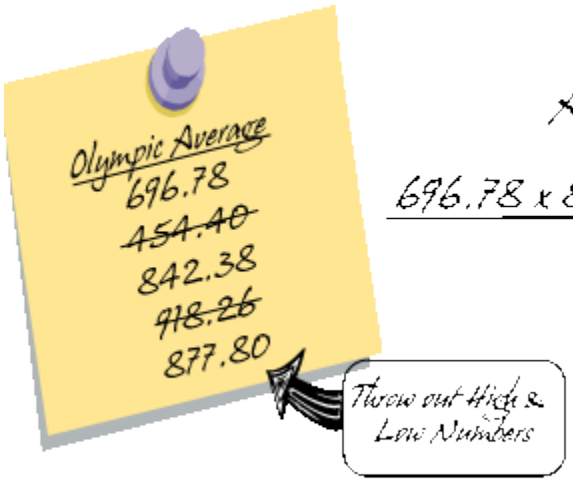
A brief description of the formulas outlined in Table 1 for the ACRE calculation vs. CCP is provided as follows.

Counter-Cyclical Payment (CCP) Calculation:

To calculate the payment rate, one needs to know the target price, the direct payment rate, and the market year average MYA price (produced by USDA)[2] and the loan rate. Simply take the target price and subtract the direct payment rate. Then, subtract the higher of the market year average price or the loan rate. This determines the CCP payment rate. For example, assume that the market year average price is below the loan rate. To calculate the CCP payment rate, we then take the target price (71.25¢/lb) and subtract the direct payment rate (6.67¢/lb) and the loan rate (52¢/lb), resulting in a CCP payment rate of 12.6¢/lb.

Average Crop Revenue Election (ACRE) Calculation:

First, one must determine the **ACRE benchmark state yield**. The benchmark is the "Olympic average" of state's yield per planted acre for most 5 recent crop years



Average the Remaining 3

$$\frac{696.78 \times 842.38 \times 877.80}{3} = 805.63$$

An Olympic average takes the previous 5 years state level yields, throws out the highest and lowest yields, and then averages the remaining 3 years of yields.

[2] The MYA is determined by USDA as the average price received by producers during that crop's marketing year. The MYA is used in a number of USDA programs and policies and is published and widely available.

Next, one must find the **ACRE state revenue guarantee**, which is the 2 most recent crop years' national market year average (MYA) price × ACRE benchmark state yield × 90%. Finally, the **ACRE state actual revenue** is the state yield per planted acre × the higher of the MYA price or 0.7 × loan rate.

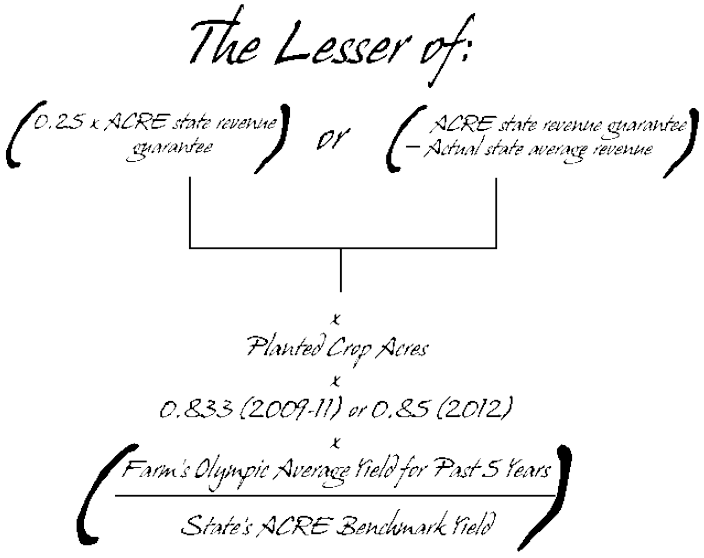
First trigger: if ACRE state actual revenue < ACRE state revenue guarantee, then farmers in the state meet the first condition for receiving ACRE protection payments.

Next, one must examine the farm level revenue:

First, the **ACRE benchmark farm revenue** is determined by taking the (5-yr Olympic average farm crop yield per planted acre × 2 year MYA Price as above) + crop insurance indemnities per acre. This calculation provides the historical average farm revenue for comparison with the current farm revenue. The current **ACRE actual farm revenue** is the actual commodity farm yield ***per planted acre*** × the ACRE national MYA price.

Second trigger: if ACRE actual farm revenue < ACRE benchmark farm revenue, then the farm meets the second condition for receiving ACRE protection payments.

Now, if the state level trigger **AND** the farm level trigger are met, we can calculate the ACRE payment to the farm:



The above calculations should provide a sense of the complexity of the decision-making process for the ACRE decision. To assist in understanding how these calculations translate into actual farm outcomes, we conducted a comparison of CCP and ACRE outcomes in the recent past.

Historical Comparison of ACRE and CCP on Cotton Farms

The following provides examples of the calculations for a sample of four actual farms in the southern Texas High Plains for the cotton portions of those farms; note that this is for the cotton acres on the farms only, not for the entire farms. The examples show what the program payments would have been under the CCP and ACRE options if both programs had been in effect during the periods of past years shown. The historical calculations are useful to provide perspective for decision makers, but they do not forecast the future.

Table 2 presents the state-level guaranteed revenue and actual revenue calculations based on historic price and yield information for Texas cotton. Note that had both programs been in effect during the past six years, all Texas cotton producers in the CCP program would have been eligible for CCP payments (ranging from $.05/lb. to $.126/lb.), while those in the ACRE program would have been eligible for ACRE program payments (the first trigger would have been met) only once in the last five years on dryland cotton and not at all on irrigated cotton. Thus, if future price and state-level yield patterns of the recent past continue, the state level trigger appears unlikely to be met.[3]

To examine the farm-level trigger for ACRE payments, we examined recent production histories of cotton from four Texas cotton farms described below:

Cotton Production Type	Base Acres	Payment Yield (lb/ac)
Irrigated (farm 1)	121.2	411
Irrigated (farm 2)	120.3	398
Dryland (farm 3)	18.3	134
Dryland (farm 4)	32.6	166

Table 3 provides the data on what the ACRE program would have produced for these four farms over the most recent six crop years. Each of the two irrigated farms would have met the farm-level trigger for ACRE payments in two of the six years (different years). One dryland farm would have met the trigger in four of the six years and one

[3] While the past five years of data reflect the most recent statewide yield/revenue relationships, it should be noted that over the past 20 years, the statewide trigger would have been met 20% of the time for irrigated and 45% of the time for dryland. We use the past 5 years because that is the relevant time period for calculations and is also the time period for which we have farm level data. Nevertheless, readers should be aware that the potential frequency of meeting the trigger is much higher than observed here, especially for dryland cotton.

would have met it in three years. The more frequent meeting of the trigger for dryland farms is not surprising given that yield variability is expected to be less on irrigated farms.[4] However, the farm-level trigger alone does not qualify a farm for the ACRE payment; both the state-level and farm-level triggers must be met. Thus, in this example for these four farms, the state trigger is met in only 2006 for dryland farms only; the two dryland farms (3 and 4) would have qualified for ACRE payments (and only in 2006). These results occur because in a state of the size and diversity of Texas, individual farm yields are not highly correlated with state average yields.

The income that would have been generated under both the ACRE and CCP program from these four farms over the six years is compared in Table 4. Here, we simply took the actual farm yield times the MYA price and then added the respective (CCP or ACRE) payments along with marketing loan gains and direct payments. Over the past years, if both programs had been in place, CCP would have resulted in significantly higher cotton revenue for the two irrigated cotton farms and one of the dryland farms. Although farm revenue was numerically higher for farm 4, the difference was not statistically significant. The implication of this finding is that CCP clearly outperformed ACRE for these irrigated farms, but we are less certain about the outcome for dryland farms.

Sensitivity Analysis

Comparative outcomes for individual farms vary primarily with U.S. average prices, state level yields, and farm level yields. In this section, we examine the sensitivity of the results presented above to selected alternative price and yield scenarios. Table 5 presents the basic results.

Case 1. US cotton prices higher by 50%.

In this case, the actual state revenue would have been less than the ACRE state revenue guarantee over the last six years for both irrigated and dryland cotton in1999/2000 and 2001/02. However, the state-level trigger results would be the same as baseline between 2002/03-2007/08. The CCP payment rate would have been zero due to the price increase. The implication of this finding is that rapid and large increases in price make the ACRE program more attractive relative to the CCP. However, because the CCP and ACRE program are both triggered off the 2-year average of the MYA price, rapid increases in the price will quickly be reflected in the MYA price, thereby negating the initial advantage of the ACRE program.

Case 2. US cotton prices lower by 50%.

In this scenario, the CCP rate would achieve its maximum value ($0.126/lb) for most of the years in the simulation. However, comparing the ACRE state revenue guarantee and state actual revenue indicates that farmers would still have had zero payments in most of the years. Thus, it appears that lower prices favor the CCP program over the ACRE program under identical yield outcomes.

[4] These farms do not constitute a random sample and the results, therefore, are not generalizable to the population of farms. They are for demonstration purposes only and should not be sonstrued as a prediction of farms in general.

Case 3. US cotton prices lower by 50% and state average yields higher by 50%.

In this scenario, CCP rate would have been the same with case 2. However, farmers would still have zero payments under ACRE in most of the years.

Case 4. US cotton prices higher by 50% and state average yields lower by 50%.

In this scenario, the results would be the same as case 1.

> Note that none of the cases led to a change in the state triggers from the baseline; only the probability of a state and farm trigger being met at the same time changes.

Conclusion

This briefing paper aims facilitate cotton farmers' understanding of issues that figure into the choice between enrolling in the ACRE or CCP programs – a choice they have to make in 2009. Comparing the CCP and ACRE programs based on historical prices and yields reveal that even if farm actual revenue is less than the farm benchmark revenue, farmers would receive nothing from ACRE program if actual state revenue is more than the state guarantee. However, farmers would receive CCP as long as national average market price is less than 64.58 cents/lb.

There are several key caveats that decision makers should consider.

1. **ACRE is a one-time election**. Once a producer makes the decision to participate in the ACRE program with a crop, they cannot return to the CCP program with that crop **over the 5 years** of the farm bill.
2. **What if I want to produce crops different than my base?** The law appears to be written so that farms can produce anything besides fruits and vegetables without losing *eligibility* for payments. However, the law states that a 5-year production history is needed to calculate payments. It is not clear how USDA will handle production history determination with a new crop.
3. **ACRE is a whole-farm decision.** While this analysis has only addressed cotton in isolation and only in Texas, farmers should be aware that because of planting flexibility, it may be advantageous to plant crops other than cotton despite having a cotton base. This, of course, complicates the decision. This analysis nevertheless provides partial information relevant to the decision.
4. **ACRE impacts are *extremely* individual in nature.** Because ACRE is triggered off farm revenue in part, the impacts of ACRE cannot be predicted across all farms. So, while we can provide examples and case studies to help guide your decision, our models are no substitute for your own analysis based on the calculation procedures outlined here.
5. **Past history is instructive, but not conclusive.** The results here depend on the relationship (correlation) between the farm level and state level yields.

Looking only at past history is instructive inasmuch as the correlations in the past persist into the future. But, decision-makers should be aware that these relationships can change through time.

Finally, the ACRE/CCP decision is not without risk. The caveats above are intended to highlight some of the factors that should be considered, but, as always, conditions can and do change, resulting in unforeseen outcomes. Decision-makers should carefully weigh the advantages and disadvantages of each program on their operation.

NOTE: CERI is developing a web-based tool to aid producers and their advisors in examining their individual situations. At present, the target date for release of this November. It will be available at www.aaec.ttu.edu/ceri/acreevaluator.php

References

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Table 1. A comparison between CCP and ACRE programs

Program Name	CCP program	ACRE program
Loan Rate	Fixed at 52¢/lb	36.4 ¢/lb
Direct payments	6.67¢/lb	5.336 ¢/lb
Target price	71.25 ¢/lb	71.25 ¢/lb
Counter-Cyclical payment (CCP)	Based on Fixed program yields and acreages; CCP are available whenever the effective price is less than the target price. The payment amount is equal to the product of the payment rate, the payment acres (85% of base acres), and the payment yield. The effective price is equal to the sum of 1) the higher of the national average farm price for the marketing year or the national loan rate and 2) the direct payment rate $\text{Payment rate}_{cotton} = (\text{target price})_{cotton} - (\text{direct payment rate})_{cotton} - (\text{higher of commodity price or loan rate})_{cotton;}$ $CCP_{cotton} = (\text{Base acres}]_{cotton} \times 0.833) \times (\text{payment yield})_{cotton} \times (\text{payment rate})_{cotton}$	Offers producers the option of enrolling in a new revenue-based counter-cyclical program: Creates the new Average Crop Revenue Election (ACRE) program beginning in crop year 2009; ACRE is a state-based revenue guarantee for participants based on the 5-year state average yield and the 2-year national average price; ACRE provides producers with payments for a commodity when the actual state revenue for the commodity is less than the revenue guarantee. To receive ACRE, producers have to give up CCP, 20% direct payments, 30% loan rate. **Payment Determination** - There are two tests that must be met for producers to receive payments under the ACRE program – at the state and farm levels. Eligible producers receive payment if actual state revenue for a crop is less than the state ACRE program guarantee for that crop **AND** only if the actual farm revenue for a crop is less than the farm ACRE benchmark revenue for the crop **ACRE State Program Guarantee** - 90% * (5-yr Olympic rolling avg state yield per planted acre) * (2-yr rolling avg of national average market price) (Note that the national average market price is defined as higher of national MYA price and marketing loan rate); Starting in 2010, the ACRE guarantee shall not increase or decrease by more than 10% from the preceding crop year. Provisions to allow separate guarantees for irrigated and non-irrigated land under certain conditions. **Actual State Revenue** - Actual state yield per planted acre * higher of national avg. market price and marketing loan rate **Actual Farm Revenue** - Actual farm yield * higher of national MYA price and marketing loan rate **Farm ACRE Benchmark Revenue** - (5-yr Olympic rolling avg farm yield) * (2-yr rolling avg national market price) + crop insurance premium (Note: any increased insurance premiums are reflected in benchmark but actual revenue does not include indemnities) **Payment Rate per Acre** - Lesser of (ACRE State Program Guarantee - Actual State Revenue) and 25% of ACRE State Program Guarantee **Payment Acres** - 83.3% of Planted or considered planted in '09-11; 85% of PCP in '12; PCP may not exceed total base acres on the farm **Individual Farmer Payments** - Payment Rate * Payment Acres * (5-yr Olympic rolling avg farm yield / 5-yr Olympic rolling avg state yield)

Table 2. State-level ACRE and CCP Program Calculations for Cotton in Texas

	National MYA Price ($/lb)	State Yield (lb/acre)	5 year Olympic Average State Yield (lb/acre)	State Guarantee Revenue ($/acre)	State Actual Revenue ($/acre)	First Trigger Met?	CCP rate ($/lb)
			----------Irrigated----------				
2002/03	0.43	696.78	562.85	187.91	302.33	No	0.126
2003/04	0.60	454.40	578.43	268.13	270.91	No	0.050
2004/05	0.43	842.38	522.52	240.78	360.37	No	0.126
2005/06	0.47	918.26	578.06	234.35	434.43	No	0.126
2006/07	0.46	877.80	703.30	296.86	408.09	No	0.126
2007/08	0.57	1043.48	805.66	376.72	599.17	No	0.072
			----------Dryland----------				
2002/03	0.43	200.46	236.30	78.89	115.85	No	0.126
2003/04	0.60	349.86	220.06	102.01	187.94	No	0.050
2004/05	0.43	121.65	262.08	120.77	215.65	No	0.126
2005/06	0.47	316.36	262.08	106.25	251.35	No	0.126
2006/07	0.46	216.06	362.11	152.84	81.57	Yes	0.126
2007/08	0.57	219.06	362.11	169.32	382.80	No	0.*072*

Table 3. Farm Level ACRE Revenue Comparison

	Actual farm Yield (lb/acre)	Five year Olympic Rolling avg Farm yield (lb/acre)	ACRE Farm Benchmark Revenue ($/acre)	Actual Farm Revenue ($/acre)	Second Trigger Met?
Farm 1					
2002/03	672.00	518.00	203.26	291.58	No
2003/04	0.00	569.33	304.41	0.00	Yes
2004/05	1098.00	408.33	222.73	469.72	No
2005/06	1016.00	460.67	218.62	480.67	No
2006/07	737.00	574.33	283.67	342.63	No
2007/08	25.00	808.33	434.43	14.36	Yes
Farm 2					
2002/03	703.00	518.00	204.31	305.03	No
2003/04	0.00	348.33	191.57	0.00	Yes
2004/05	1036.00	410.00	190.70	443.20	No
2005/06	942.00	237.33	197.03	445.66	No
2006/07	578.00	579.67	273.66	268.71	Yes
2007/08	910.00	659.33	399.98	522.52	No
Farm 3					
2002/03	216.00	276.33	116.13	93.72	Yes
2003/04	0.00	234.00	132.62	0.00	Yes
2004/05	1141.00	234.00	134.89	488.12	No
2005/06	1181.00	234.00	116.99	558.73	No
2006/07	158.00	534.67	265.55	73.45	Yes
2007/08	0.00	505.00	277.16	0.00	Yes
Farm 4					
2002/03	0.00	103.00	51.54	0.00	Yes
2003/04	427.00	103.00	70.02	254.58	No
2004/05	0.00	108.33	55.47	0.00	Yes
2005/06	609.00	74.00	47.89	288.12	No
2006/07	13.00	182.00	97.96	6.04	Yes
2007/08	616.00	146.67	89.29	353.71	No

Table 4. Comparison of Example Cotton Farm Revenue Under the CCP and ACRE Programs for the Past Six Years.[a]

	Farm revenue Under the CCP Program	Farm revenue Under the ACRE Program	Average Percentage Difference
Farm 1			
2002/03	50,416	37,281	
2003/04	4,844	2,259	
2004/05	77,453	59,483	
2005/06	72,590	60,135	
2006/07	55,239	43,349	
2007/08	7,947	3,986	
Average*	**44,748**	**34,416**	**30%**
Farm 2			
2002/03	53,381	38,537	
2003/04	4,776	2,172	
2004/05	72,279	55,763	
2005/06	67,710	55,433	
2006/07	45,629	34,157	
2007/08	68,922	64,571	
Average*	**52,116**	**41,772**	**25%**
Farm 3			
2002/03	2,776	1,811	
2003/04	351	111	
2004/05	11,357	9,090	
2005/06	12,052	10,269	
2006/07	2,458	2,302	
2007/08	334	111	
Average*	**4,889**	**3,949**	**24%**
Farm 4			
2002/03	326	245	
2003/04	8,669	8,598	
2004/05	307	245	
2005/06	11,186	9,577	
2006/07	1,352	962	
2007/08	12,184	11,692	
Average	**5,671**	**5,220**	**9%**

[a] These calculations are for cotton only. If a farmer produced something other than cotton on acreage, marketing loan gains and ACRE payments were not included.

* CCP and ACRE average revenues are statistically different at the 0.05 level of significance.

Table 5. Sensitivity Analysis for Different Possible Cases of Price and Yield Changes.

		Case 1		Case 2		Case 3		Case 4	
		CCP Rate	ACRE State Trigger	CCP Rate	ACRE State Trigger	CCP Rate	ACRE State Trigger	CCP Rate	ACRE State Trigger
Irrigated									
	2002/03	0.000	No	0.126	No	0.000	No	0.126	No
	2003/04	0.000	No	0.126	No	0.000	No	0.126	No
	2004/05	0.004	No	0.126	No	0.004	No	0.126	No
	2005/06	0.000	No	0.126	No	0.000	No	0.126	No
	2006/07	0.000	No	0.126	No	0.000	No	0.126	No
	2007/08	0.000	No	0.126	No	0.000	No	0.126	No
Dryland									
	2002/03	0.000	No	0.126	No	0.000	No	0.126	No
	2003/04	0.000	No	0.126	No	0.000	No	0.126	No
	2004/05	0.004	No	0.126	No	0.004	No	0.126	No
	2005/06	0.000	No	0.126	No	0.000	No	0.126	No
	2006/07	0.000	Yes	0.126	Yes	0.000	Yes	0.126	Yes
	2007/08	0.000	No	0.126	No	0.000	No	0.126	No